OHIO AGRICULTURAL

Experiment Station,

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AUGUST, 1888.

SMALL FRUITS.

OFFICES AND EXPERIMENT GROUNDS
ON THE FARM OF THE OHIO STATE UNIVERSITY,
COLUMBUS, OHIO.

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Ohio Agricultural Experiment Station.

BULLETIN NO. 5. SECOND SERIES.

HORTICULTURAL DEPARTMENT.

The following announcement was published in Bulletin No. 2, and is repeated for the benefit of those who may not have received that bulletin:

The testing of varieties of fruits and vegetables is an important part of the horticultural work of the Station, and is so conducted as to be of service to originators and to the general public. Varieties are received from originators and reports given to the owners from time to time, whenever desired. These partial reports are made public at the discretion of the Station, but are usually withheld until the variety is offered for sale, and in case it is not thought worthy of introduction by the owner, no public report is made. Thus originators are aided in testing their productions, while the public has the advantage of early knowledge concerning new varieties, and is not burdened with reports of varieties that are unworthy of dissemination. Varieties that are sent for trial are not propagated beyond the requirements of experimentation, nor are plants, cuttings or scions of such varieties offered for sale, nor given away or exchanged, *without consent of the owners*, but no responsibility will be assumed in case of theft, beyond a reasonable diligence to prevent it.

As far as possible, all varieties are subjected to the same conditions, and no agreement will be entered into to give special treatment in any case.

Varieties are not desired unless they are thought to have special merit. The Station cannot undertake to test long lists of seedlings, for the simple purpose of sifting out the undesirable varieties for the benefit of individuals. Unless a variety is likely to be disseminated, and thus become of public interest, it is not wanted, although no variety will be refused that is sent in good faith.

In addition to the testing of varieties, strains of varieties from different sources have been compared in case of vegetables. This work promises even greater usefulness than the testing of varieties proper. For this reason the Station is especially desirous of obtaining improved strains of varieties from commercial and private seed growers. Samples of this kind will receive careful attention and be given a thorough trial.

Care should be taken in sending new varieties to label the packages distinctly with the name or number of variety, and name of sender, together with postoffice address. A letter or card should be sent at the same time, giving full particulars as to origin and parentage if known, and of such other facts as may be of interest.

STRAWBERRIES.

The strawberry crop of this year was far from satisfactory, owing to the drought of last season, which prevented the plants making a good growth. This season was very dry also, during the time of fruiting. The early varieties were not seriously affected, but none of the late sorts yielded more than two pickings. The entire season, from first to last ripe fruit, did not exceed three weeks, hence a fair report cannot be given of the late varieties.

SPRING VERSUS FALL-SET PLANTS.

Plants of nearly all varieties were propagated in beds early in July, 1887, and transplanted into the field the last of July and the first of August. The season was very unfavorable for transplanting, but by means of irrigation the plants were kept alive, although the growth was not satisfactory. These plants yielded about half as much fruit as the spring-set plants. On a few rows of Crescents, however, that were planted very closely—about six inches apart in the rows—the yield was nearly equal to that of the spring-set plants, while the fruit was much finer in appearance. This indicates that market gardeners might profitably grow strawberries as a second crop, by close planting, even though the yield is less than on plants that have had an entire season in which to grow. Planting later than August 1 does not seem to be desirable in this latitude, even though potted plants are used. The method is not practicable for commercial growers, who plant in large quantities, but it has decided advantages for those who wish to test varieties, and for those who practice high cultivation on small areas. The plan of taking the young buds, or tips of the runners, before or soon after they have become rooted, and planting in beds or in pots, giving shade and water until well rooted, has decided advantages over that of sinking the pots alongside the rows and causing the runners to take root in them.

The following table gives the weights and measurements taken of the newer and some of the leading old varieties; also date of first ripe fruit and first picking. The date of the first picking is given, because the date of first ripe fruit alone does not show comparative earliness, in many cases. It will be seen that these two dates are very near together in some cases, and a number of days apart in others. This is owing to the fact that some varieties ripen a few berries quite early, but afford no picking for several days, while others yield good pickings from the start. A fair picking could have been made from the Crescent and Covell two or three days before the time noted, but generally the pickings were

made as though intended for market. This was kept up throughout the season. Weights and measurements were taken at each picking of twenty-five average berries, and of five selected berries. Owing to the drought, which cut the crop short, the length of season cannot be given. A sufficient number of samples could not be obtained of all the new varieties on trial.

Name of Variety.	Date of first ripe fruit.	Date of first picking.	Weight of five selected berries.	Weight of one hundred average berries.	Average diameter of five selected berries.
Anna Forest	June 6th.	June 13th.	1⅘ oz.	20⅓ oz.	1⅛ in.
Belmont	June 11th.	June 13th.	2 7/10 oz.	25⅕ oz.	1⅛ in.
Bubach	June 6th.	June 8th.	2 3/10 oz.	37⅘ oz.	1⅜ in.
Crescent	May 30th.	June 6th.	1⅗ oz.	21⅖ oz.	1⅛ in.
Cumberland	June 6th.	June 7th.	2 1/10 oz.	32 oz.	1¼ in.
Covell	May 29th.	June 6th.	1 3/10 oz.	17 oz.	1 1/16 in.
Champion	June 4th.	June 6th.	1⅘ oz.	22½ oz.	1⅛ in.
Downing	June 6th.	June 9th.	1 9/10 oz.	27 oz.	1⅛ in.
Gold	June 11th.	June 13th.	2 oz.	30 oz	1¼ in.
Gandy	June 7th.	June 11th.	2½ oz.	31 oz.	1⅜ in.
Jewell	June 4th.	June 6th.	2 1/10 oz.	30 3/10 oz.	1¼ in.
Jessie	June 4th.	June 6th.	3½ oz.	35½ oz.	1½ in.
Lida	June 5th.	June 6th.	2⅖ oz.	32 oz.	1¼ in.
Miner's Prolific	June 6th.	June 7th.	2 1/10 oz.	26⅔ oz.	1¼ in.
May King	June 4th.	June 6th.	1⅕ oz.	21 7/10 oz.	1⅛ in.
Ontario	June 11th.	June 11th.	2⅕ oz.	27 oz.	1¼ in.
Old Iron Clad	June 2d.	June 6th.	1 1/10 oz.	15 oz.	1 in.
Ohio	June 14th.	June 16th.	1 3/10 oz.	17 oz.	1⅛ in.
Photo	June 4th.	June 9th.	1 9/10 oz.	18 oz.	1⅛ in.
Parry	June 6th.	June 7th.	2 3/10 oz.	24 oz.	1⅜ in.
Pearl	June 4th.	June 7th.	2 1/10 oz.	24 oz.	1¼ in.
Sucker State	June 4th.	June 9th.	1 7/10 oz.	22 oz.	1⅛ in.
Shaipless	June 11th.	June 11th.	3 oz.	28½ oz.	1½ in.
Truit's Surprise	June 6th.	June 9th.	1½ oz.	22 oz.	1⅛ in.
Warfield	June 4th.	June 6th.	1⅘ oz.	20½ oz.	1⅛ in.

NOTES ON VARIETIES.

In accordance with previous custom both old and new varieties are included in our lists. This is done not only to afford means of comparison, but to furnish facts concerning old sorts, which facts are quite as useful to many as information relating to new varieties.

Anna Forest.—In some respects this is a desirable variety for home use. It is not sufficiently productive for market purposes; besides, the fruit lacks somewhat in firmness, and the plants are subject to rust.

Belmont.—No more favorable report can be given of this variety

than in former seasons. It has all the essentials of a good variety except productiveness, but is almost sure to disappoint in the crop.

Bomba.—Fruited on fall-set plants only. The plants were very weak and made a poor growth, consequently wintered poorly, and bore a very light crop of imperfect berries. Plants set last spring have not made a satisfactory growth, although they are much better than those received last season. It is probably one of those varieties that require rich soil and high cultivation.

Bubach.—The most luxuriant in foliage of all varieties tested. It was, however, somewhat disappointing in fruit, the quantity seemingly being less than such plants ought to produce. The quality is rather poor, and towards the last of the season the berries do not make good appearance in the basket. On the whole, however, it is a remarkable variety, and possesses sufficient good qualities to win for it a permanent place on the list of profitable market sorts. It can hardly take high rank for family purposes, but as a market variety it will prove to be valuable, and may be planted with safety by commercial growers. It ripens the main part of its crop rather late. It withstands drought well.

Crescent.—In most sections this is still regarded as the most profitable of the old varieties. It is the standard here both for productiveness and earliness.

Cumberland.—Too well known to require an extended notice. It can be recommended for private growers only, not being sufficiently productive for market purposes.

Covell.—This variety is about one picking earlier than the Crescent, and deserves trial by those who find early berries profitable. It will thrive on light soil, hence could be grown on gravelly or sandy southern exposures, where it would ripen nearly two weeks in advance of most varieties. It yields the bulk of its crop at two pickings, after which the berries are too small to be marketable, even with good cultivation. It is not a profitable market variety, except as indicated, or possibly for forcing.

Carmichael.—Plants set in spring of 1887 grew quite well, as did those set in 1888, but the former showed a decided falling off in vigor, even before the drought set in, hence produced very little fruit. It fared the worst by drought of any late sort on the grounds. A fair report cannot be given without further trial.

Crimson Cluster.—Not satisfactory here as to growth and productiveness, and can hardly become popular generally.

Gold.—Not so satisfactory as last season, as it was planted on less fertile soil. It requires high cultivation, which it will amply repay, but will fail on light soils where many other varieties succeed. In certain localities and in the hands of good cultivators it will doubtless prove profitable, but can hardly become a general favorite.

Gandy.—One of the best to withstand drought, of the late sorts, which was greatly in its favor the present season. In growth and healthfulness of foliage it is unsurpassed, although there is some doubt as to its productiveness. Should it prove to be sufficiently prolific it will surely take rank as a profitable market variety.

Haverland.—Fruited on fall-set plants only, from which it would not be safe to venture an opinion. There can be no doubt, however, as to health, vigor and productiveness of the plants. It seems to be fully as productive as the Crescent, and by some it is said to excel that variety in this particular. The berries are rather above medium size and quite uniform, not very firm nor of the very best quality, but no more defective in these particulars than the Crescent. Some of the berries on our plants were ill shaped, showing that fertilization had been imperfect, and indicating that it requires a plentiful supply of pollen. Crescents in the same row were perfectly fertilized, as perfect flowering sorts were no more than a rod distant. The indications are that the Haverland will prove to be a formidable rival of the Crescent, and take rank as a profitable market variety, but will hardly become a favorite with amateurs.

Hoffman's.—Resembles the Champion or Windsor Chief, but the plants are rather more dwarf and the berries a trifle smaller. Not very desirable, although it has some good points.

Itasca.—All that can be desired as to productiveness and quality, but the berries are too small for it to become a profitable market variety.

Jewell.—Essentially the same may be said of this variety as in former reports. It will succeed only under favorable conditions, but responds readily to high cultivation. It sends out very few runners, and is especially well adapted to hill cultivation.

Jessie.—This variety has for three seasons given very satisfactory results here, on both fall and spring set plants, and on several different kinds of soil. It does not yield as heavily as the Crescent, but does not fall far below, while the fruit would sell as high in market as that of any other variety, because of its fine appearance and good quality. Commercial growers can hardly fail to find profit in the Jessie, and it will

surely please amateurs. It it one of the best varieties for the family garden. Some unfavorable reports have been heard concerning it, as many of the plants first sent out failed to grow, and it does not seem to be equally well adapted to all localities, being rather more restricted in range than the Bubach and Crescent. It is not far from the truth to say that it yields more first-class fruit than any other variety at the Station, but this locality cannot be taken as representing the whole State. Every grower ought to try it on his own soil, especially if he can sell choice berries at a premium, otherwise he may find more profit in the Crescent and Haverland.

Lida.—This can hardly become a general favorite, and yet it has some very good points, indicating that it may prove to be valuable in certain localities. The fruit is uniformly large and showy and of good quality. The plants are rather weak, and seemingly produce more berries than they can mature, yet as a matter of fact nearly all do mature in good condition. The variety ought to be tried by amateurs and such commercial growers as can give a little extra care in order to secure fine fruit.

Louise —Not yet fruited here, but the plants are not making a satisfactory growth.

Logan.—Not fully tested, but seems to be variable. Many of the berries were quite large and fine, others were small and inferior. It seems to have many good points, but further trial is necessary in order to determine its true place.

Miner's Prolific.—This is not a new variety, but it is deserving of more extended trial than has been given it. It is particularly valuable for near market, and for family use.

May King.—This is now a well established early variety, and is a good companion for the Crescent. It was much less productive than usual here the past season, being considerably damaged by the drought. Its productiveness has doubtless been overrated and its earliness exaggerrated, but it is nevertheless a valuable variety.

Mammoth.—The fruit is of large size and good quality, but thus far we have not been able to obtain it in sufficient quantity. It is doubtless better for amateurs than for commercial growers.

Monmouth.—Quite early and may prove to be desirable, but has not shown sufficient vigor and productiveness here.

Norman.—No variety that has been tested here surpasses the Norman, when at its best. It requires high cultivation and is more suitable for amateurs than for commercial growers.

Ontario.—It is scarcely possible to show wherein this variety differs from the Sharpless. At all events it fills the same place as the Sharpless, *i. e.* it is suitable for amateurs, and in a few localities is valuable for market.

Ohio.—Failed to ripen more than two pickings because of the drought. It can be recommended as a late market variety only, and should be given a moist, rich location, and if possible a northern exposure. Under such conditions it can hardly fail to give satisfactory returns, but on thin, light soils it may not prove to be profitable.

Parry.—From the same source as the Lida, and has much the same character of foliage, but not equally valuable. It is lacking in vigor, hence cannot be recommended for general planting.

Pearl.—This variety has fruited here but one season, and under adverse circumstances, but produced a crop that might be considered good in a favorable season, as it withstood the drought almost perfectly. The plants are healthy and productive, while the fruit, although not large, is above medium and very uniform in size and regular in outline, making a good appearance in the baskets. Further trial is necessary before speaking advisedly concerning it, but the indications are that it will be suitable for general planting. Commercial growers will do well to give it a trial.

Sunapee.—Plants quite productive, and fruit of good quality, but too small for market purposes. Cannot be recommended for any purpose.

Truit's Surprise.—Quite promising in growth and when in bloom, but very disappointing both in size and quantity of fruit. The first berries are fair in size, but scarcely any are marketable after the second picking.

Warfield.—This variety made a good growth in 1887, in spite of the dry weather, and gave promise of a heavy crop in the spring. It was one of the first to succumb to the drought, however. The first and second pickings were about as early and equal in quantity to the Crescent, but after that there was a decided falling off, and no berries of any account remained after the fourth picking, while the Crescent held out much longer. The fruit is of good color and makes a fine appearance in the baskets. It is rather soft, of medium size and not of high quality, but will sell well. On the whole the Warfield is a promising variety, and is deserving of further trial. It will undoubtedly prove to be valuable in some localities.

TRIAL OF FERTILIZERS ON STRAWBERRIES.

In the Spring of 1885 a piece of ground, considerably worn, was selected and planted with strawberries. The ground was laid off in plots 9 feet by 30 in size.

Plot No. 1 received no fertilizer.
" " 3 " superphosphate at the rate of 300 lbs. per acre.
" " 5 " nitrate of soda " " 400 " "
" " 7 " sulphate of potash " 400 " "
" " 9 " muriate " " " 200 " "

In addition to the above, other plots were treated with common salt, barnyard manure, bone meal and sulphate of ammonia. The alternate plots were left unfertilized. In the Springs of 1887 and 1888 Nos. 3, 5, 7 and 9 were again treated. Owing to dry weather and lack of care in applying the fertilizers many of the plants were lost, and a poor stand was secured in consequence. This necessitated replanting, hence samples for chemical analysis could not be secured in 1887. Samples from the five plots named were taken of the crop of 1888 and submitted for analysis to Prof. H. A. Weber of the State University; the object being to ascertain the effect of the various fertilizers upon the quality of the fruit. The variety used was the Crescent Seedling.

The following is his report:

INGREDIENTS.	PLOT NUMBER.				
	1	3	5	7	9
Sugar (fruit)	7.47	7.08	7.67	7 83	7.73
Free acid (malic)	1.35	1.09	1.31	1.13	1.24
Seed	1.10	1.02	1.00	1.09	1.01
Pectose, Protein, combined acids, etc.	1.06	1 68	0 96	1.39	1.28
Fiber	0.28	0.26	0.30	0.28	0.29
Ash, exclusive of seeds	0.51	0.53	0 54	0.50	0.50
Water	88.33	88.34	88.22	87.78	87.95
Total	100.	100.	100.	100.	100.

It will be seen from the above analysis that the several samples were practically identical, and that the various fertilizers applied on the different plots had no effect in changing the composition of the fruit. So far as taste and appearance of the fruit were concerned, no difference could be detected in the samples from the several plots. In two other respects, however, there were decided differences. The fruit ripened

several days earlier on the superphosphate plot than upon the nitrate of soda plot, and upon another plot where sulphate of ammonia was used the difference in time of ripening was still more marked, so much so that at the time the other plots were picked a sufficient quantity of fruit for picking could not be found on this plot. The difference in growth of the plants and color of foliage was also very marked. The plants on the superphosphate plot and unfertilized plots could hardly be distinguished; but those on the nitrate of soda plot were much stronger in growth and the foliage was of a darker green color than on those named; while the extreme was still greater where sulphate of ammonia was applied. Potash seemed to have no appreciable effect on the growth and color of the foliage. It was also evident that while sulphate of ammonia and nitrate of soda promoted growth of foliage, they decreased the quantity of fruit.

Plots that were treated two seasons and not the third, showed no effect from the previous applications, except in the cases of bone and barnyard manure. The effect of the manure was greatest the first season in securing a good stand. Incidentally it may be stated that the field was infested with white grubs. None of the substances applied, including salt, seemed to have the least effect in driving away the grubs, even when employed in sufficient quantities to kill the plants (this was done on some other plots to test the effect of fertilizers in repelling the white grub), hence the absurdity of the advice often given to apply salt in order to drive away the white grub. The plants on the plots where manure was applied, grew more vigorously than any of the others, and made more runners, and on these beds an almost perfect stand was secured.

The same series of experiments is in progress with raspberries and pears.

Several varieties of strawberries were also submitted to Professor Weber for analysis. Other varieties would have been analyzed, but for the difficulty in securing fair samples on account of dry weather. His report is as follows:

	Miner.	Bubach.	Jewell	Jessie.	Cumberland.
Sugar (fruit)	9.05	5.75	6.25	6.00	5.55
Free acid (malic)	1.60	1.13	0.93	1.34	1.07
Seed	1.55	0 78	0.75	0 93	1.24
Pectose, Protein, combined acids, etc	0.86	1.96	0.70	1.80	1.48
Fiber	0.42	0.35	0.26	0.35	0.27
Ash exclusive of seeds	0.51	0.45	0 44	0.47	0.51
Water	86.01	89.58	90 67	89 11	89.88
Total	100.	100.	100.	100.	100.

The above named samples were taken during an extremely dry time, hence the per cent. of sugar is probably much higher than the average. This is confirmed by analyses made last season by the same authority. The amount of sugar found then in the Crescent was about 53 per cent. of that found the present season; the weather being very wet in 1887 when the samples were taken. The per cent. of acid was nearly the same both seasons. That is, the relative proportion of acid to sugar was nearly twice as high in wet weather as in dry weather.

It would, perhaps, not be safe to institute comparisons between varieties without a greater number of analyses. It is probable that the Cumberland, would, on the average, show a higher per cent. of sugar, as the quantity of fruit from which to select samples was less than the others. The other samples, so far as known, represented fair averages.

If we take the analysis of the Crescent from the unfertilized plot, we find that it stands second, and next to the Miner in sugar, and occupies the same place with reference to acid. That the Crescent is high in acid will be doubted by no one, but that it is also comparatively high in sugar some may find it hard to believe, and it will be equally surprising that the Jewell has less acid than the Jessie. A greater number of analyses might change these figures, but it should be remembered that the taste is not a sure guide in determining the proportions of sugar and acid, and that flavor may disguise either one or both. The Jessie has less sugar and about the same quantity of acid as the Crescent, but is much more palatable because of having higher flavor. The berries were all taken from mulched beds, and the per cent. of sugar is probably lower on that account.

It will be seen that there is quite a difference in the per cent. of seeds in the varieties named, but the per cent. in all is quite low in

comparison with the wild strawberry. Professor Weber, in a paper before the Columbus Horticultural Society, in speaking of two varieties, says: "According to Fresenius the wild strawberry contains six per cent. of seeds. The Crescent seedling was found to contain 1.52 per cent. seeds, and an unnamed seedling 1.50 per cent. seeds. In other words, the amount of seeds in these two cultivated varieties has been reduced 4.5 per cent., or, 75 per cent. when compared with the seed content of the original wild berry."

This shows that the cultivated strawberry is superior to the wild as a food, and considering the additional fact that the ratio of acid to sugar is lower in the cultivated than in the wild berry, we may well be content to lose something in flavor for the sake of greater gains.

RASPBERRIES.

The season of 1888 was quite favorable for the raspberry crop, as an abundance of rain fell during the time of fruiting. Some of the early varieties were doubtless checked somewhat by previous dry weather, but as the cultivation had been thorough they were not seriously damaged.

Both red and black varieties have been considerably damaged, on the grounds of the Station, by the raspberry blight. The birds have also been a source of annoyance, taking a large share of the crop of some of the early and late varieties, when berries were scarce. These causes detract somewhat from the value of the following report, and have rendered it impossible to make notes in such accurate detail as seemed desirable. Concerning some varieties there is nothing new to report, and the same remarks will apply as were made in bulletin 2, but for the benefit of those who may not have seen that bulletin, they are repeated.

Ada—This is the second season that the Ada has fruited here, and has thus far been satisfactory, with the exception of showing a tendency to blight. As the blight is not troublesome in most other sections, and so far as known does not appear at all in those localities where the raspberry is most at home, there need be no fear on that score. In vigor and productiveness the Ada equals the Gregg, and perhaps excels it in the latter particular, and is about the same in season, continuing in bearing a little longer, if there is any difference. In fruit, the two varieties are similar, the Ada being a trifle the smaller. We have not been able to test its hardiness, but there can hardly be a doubt but it will prove satisfactory in that respect. Commercial growers will do well to give it a trial.

Carman.—Plants moderately vigorous, but quite prolific; fruit of medium size, of fine appearance and good quality. Season about the same, or a few days later than the Tyler. Although not fully tested it does not give evidence of superiority to the Tyler or Souhegan, but it is without doubt a valuable variety.

Crimson Beauty—The plants of this variety have not always passed the winter well here, and are shy bearers. It is, however, one of the earliest of the red varieties, and the fruit is large and beautiful. It is thought by some to be a profitable market sort, but does not sustain that reputation generally.

Cuthbert—Although not a new variety, there seems to be much difference of opinion as to its value. It seems to succeed in some localities but it has never given a crop here. It is perhaps the most unsatisfactory of all the red sorts.

Earhart.—Fruited here for the first time last season. The plants are vigorous and healthy, and apparently productive. It is probably one of the best of the everbearing sorts. The first crop this season was nearly equal to that of most other varieties, and there are still considerable numbers of unripe berries and blossoms.

Golden Queen.—So far this variety has proven to be all that has been claimed for it. The plants are hardy, vigorous, healthy and productive, while the fruit is beautiful in appearance and of excellent quality. It is an excellent variety for home use, and might be profitably grown for some markets.

Hansell.—Plants not perfectly hardy here and only moderately productive. Although quite early it is much less profitable than the Turner, being but little earlier, and far less productive.

Hilborn.—This variety has thus far given entire satisfaction here, the plants being hardy, vigorous and productive, while the fruit is unsurpassed in appearance. It can hardly fail to take rank as one of the best second-early black caps. Another season's trial confirms what has been said of this variety in previous reports. Its uncommon vigor, productiveness and beauty of fruit commend it to the attention of fruit growers generally.

Johnston's Sweet.—This is another good second-early black-cap, and is thought by some to excel all others in quality. It has shown no weakness here, except that the canes have been affected more than most other varieties by blight. It produced but little fruit the past season owing to the blight. As stated concerning the Ada, this need cause no

uneasiness to those living in more favored sections. It is a safe variety to try.

Marlboro.—There is still much difference of opinion as to the value of this variety. It does not rank as a prolific bearer here, and yet is valuable, as it uniformly gives a fair crop of very fine berries. It surely has sufficient merit to warrant further trial.

Nemaha.—Thus far this variety has not proven equal to the Gregg in productiveness and size of fruit. Not fully tested as to hardiness. Another season's trial shows that it is decidedly inferior to the Gregg in the above respects, the berries being about the size of the Ohio.

Rancocas.—Resembles the Hansell, and the remarks concerning that variety will hold good for both in most respects.

Reliance.—Although not new, this variety is but little known, and not so well appreciated as it deserves. Its hardiness, productiveness and size of fruit place it among the foremost in point of profit as a market variety. The berries have the past season, shown more tendency to crumble than formerly, which detracts greatly from their appearance in the baskets.

Shaffer.—This variety is deservedly popular for home use, and in some localities for market. It is unequalled for canning purposes.

Springfield.—Former reports on this variety have been unfavorable, but the plants seem to improve in productiveness with age. It evidently requires good treatment and should be planted on rich soil. In sections where very early raspberries bring a high price it might prove to be profitable, as it yields the bulk of its crop before most other varieties have fairly begun to ripen. The berries are small but make a good appearance in the baskets.

Tyler (Souhegan).—The most reliable and profitable of early black caps. The fruit is small, and not of high quality, but sells at good prices because of its earliness. It has been reported as showing a tendency to rust in some localities, but it has not exhibited that weakness here, and it is a matter of doubt if those so reporting it have it true to name.

Turner.—Among the red varieties the Turner is still the standard for earliness and productiveness. It may not show the first ripe berries, but it will yield a good picking at an earlier date than any red sort thus far tested, with the possible exception of Highland Hardy. If the bushes are closely pruned, the fruit is sufficiently firm for near market.

It gives greater profit than any other red variety on the Station grounds. It has, however, suffered greatly the last two seasons from the blight, and an old plantation seems likely to be ruined from that cause.

ANALYSIS OF RASPBERRIES.

Six varieties were submitted to Prof. Weber for analysis, and the following report is given:

	Reliance.	Shaffer.	Ohio.	Hilborn.	Ada.	Gregg.
Sugar	1.78	2.29	2.38	2.3	2.52	2.82
Acid	.92	.69	.68	.84	.76	.64
Seed	3.5	2.67	7.2	5.24	4 44	5.61
Pectose, Protein, combined acids, etc	3.92	6.08	4 75	5.71	6.53	5.91
Ash	.43	.30	.42	.40	.45	.42
Fiber	.32	.36	.59	.51	.49	.48
Water	89.13	87.60	83 98	85.00	84.80	84.12
Total	100.	100.	100.	100.	100.	100.

The most interesting fact to practical men, brought out by the above analysis, is that certain varieties are much better adapted to drying than others. The Ohio plainly takes the lead, having more than 16 per cent of solid matter, but the Ada, Hilborn and Gregg fall but little below it, while the Shaffer takes much higher rank than commonly supposed. From the consumers' standpoint, however, the Ohio is decidedly inferior to all others, containing as it does, a very high per cent of seeds—almost half of its solid matter. It is probable that as ordinarily dried, or evaporated, about one-third of the total product is seeds, in case of the Ohio, which puts its food value very low and renders it a costly variety for the consumer to buy. The Gregg, Hilborn and Ada stand much higher, the latter excelling the Ohio in actual value by about 16 per cent. The Shaffer yields but little less profit to the grower, and is decidedly superior to any on the list, in the dried state, to the consumer.

The following table shows approximately the average product of dried fruit per bushel, as determined by experiments here and elsewhere, also the weight of seeds in that quantity of ordinary evaporated fruit. These weights, of course, vary considerably as the season happens to be wet or dry, but the comparison between varieties will hold the same in all cases.

	Average product of dried fruit per bushel of berries	One bushel of berries contains of seeds about—	One bushel of berries contain of valuable food constituents about—
Ohio	9 pounds.	2 9 pounds.	3 4 pounds.
Gregg	8½ "	2 2 "	3 9 "
Hilborn	8½ "	2 1 "	3 7 "
Ada	8½ "	1 8 "	4 1 "
Tyler	8½ "	2 4 "	3 3 "
Shaffer	8 "	1 0 "	3 8 "
Hansell		2 4 "	2 5 "
Turner		2 1 "	3 7 "
Reliance		1 4 "	2 7 "

Analysis made in 1887 by Prof. Weber. Weather very dry.

BLACKBERRIES

The first essential of a variety of blackberry in this climate is hardiness. The past winter was comparatively mild, but half hardy winter varieties sustained greater injury than in some more severe winters. This was probably due to the dry weather in 1887, which so enfeebled the plants as to greatly lessen their power to resist cold.

The estimates of hardiness given below will for this reason doubtless need revision. The lowest degree of cold during the winter was 8 degrees below zero. In 1887 the lowest point reached was 12 degrees below zero.

Ancient Briton.—Not perfectly hardy, but is without doubt sufficiently so to make it a safe variety to plant in any part of the State. The plants are vigorous, healthy and productive. The berries are of medium size, or a little larger than the Snyder and of fair quality. It is a little later in ripening than the Snyder.

Agawam.—About the same in time of ripening as Ancient Briton, or perhaps a few days later. The two varieties are about equally hardy and prolific, and so far as tested there seems to be but little choice between them.

Bonanza.—Not fully tested, but seems to be quite tender, as it has suffered more or less even in mild winters. It has never given a crop here.

Erie.—This variety is about as hardy as the Lawton here. It was considerably injured last winter, and bore only a partial crop the present season. The berries are quite large and showy, and where it proves to be hardy it will be a valuable variety.

Early Harvest.—This variety may be classed as nearly hardy in this latitude, and will yield a crop in all except unusually severe seasons. The berries are small—not larger than wild berries, but very uniform in size and beautiful in appearance. It is the earliest variety tested, coming at about the same time as the Gregg raspberry, which renders its size less objectionable. In some markets this would prove to be a valuable variety, but is not adapted to general cultivation.

Early King.—A few days later and considerably larger than the preceding, but not equally hardy. In some sections this would prove to be a valuable early market variety, but it is not sufficiently hardy for general cultivation.

Minnewaski.—On its native soil this is a hardy variety, but it has not passed the winters here unharmed. It will probably rank about with the Lawton in hardiness, but it has not been sufficiently tested to make it possible to speak advisedly on this point. In some sections this will prove to be a valuable variety, because of its productiveness and large showy fruit.

Nevada.—Quite tender, hence of no value here.

Snyder.—The hardiest variety tested, and is valuable chiefly on that account. It has a tendency to overbear and if allowed to do so the berries are quite small. If pruned quite closely, the fruit is much improved in size and texture. In many sections the Snyder can be grown with profit, but it would hardly be found desirable where wild blackberries are abundant.

Taylor.—Not equal to the Snyder in hardiness nor in productiveness, although the fruit is rather larger. For this locality it is hardly equal in value to Ancient Briton or Agawam.

Wilson Jr.—Too tender to be of any value in this latitude, as kills nearly to the ground every winter. The nature of its growth indicates that it could be easily protected by covering with soil. Its large size of fruit and productiveness make it a valuable variety where it can be grown.

Lucretia Dewberry.—This uniformly gives a crop of fine large berries, which ripen with Early Harvest, or a few days later. The berries are difficult to pick and of rather poor quality except when fully ripe and at that stage are too soft for shipment. The above defects detract from its value, but it can still hold a place alongside our best blackber-

ries. It can have but little value in sections where the best varieties of blackberries are hardy, but it is surely deserving of a place on our lists in this latitude.

Hardy Dewberry.—Not fully tested, but the plants are quite healthy and prolific. On young plants the berries are somewhat lacking in size, but are said to improve in this particular as the plants attain age. There seems to be no reason to doubt its hardiness.

Mr. O. W. Aldrich, an amateur grower, living about four miles north of the Station grounds, has kindly furnished the following report, showing the comparative hardiness of varieties of blackberries on his grounds.

Killed to the ground, *Texas Early.*

Seriously injured, *Wilson's Early, Needham's White, Sable Queen, Stayman's Early, Wilson Junior, Crystal White, Early Cluster, Kittatinny, Nevada, Hoag's Seedling, Topsy.*

Considerably injured, *Lawton, Minnewaski, Erie, Parish Pink, Dorchester, Bonanza, Dehring's Early.*

Not hurt for fruiting, *Agawam, Ancient Briton, Duncan Falls, Early King, Sadie, Snyder, Fried, Taylor, Hoosier, Wallace, Lincoln, McCracken, Newman's Thornless, Western Triumph, Wachusett, Warren, Mo. Mammoth.*

SUMMARY.

STRAWBERRIES.

Varieties.—From the tests thus far made on the Station grounds, we recommend, as worthy of trial for market purposes, Bubach, Crescent, Gaudy, Haverland, Jessie, Miner's Prolific, May King, Ohio and Pearl. The following varieties possess points of excellence that make them desirable to amateurs, namely: Anna Forest, Covell, Gold, Jewell, Lida, Mammoth, Norman, Ontario, and Warfield.

Effect of fertilizers.—In our experiments different fertilizers have had apparently no effect upon the quality of the fruit. Fertilizers containing nitrogen have apparently reduced the quantity of fruit, at the same time promoting the growth of foliage.

Quality.—Chemical analysis exhibits considerable variation in the percentage of sugar and acid in the different varieties, but there seems

to be no direct relationship between this percentage and the quality of the fruit. In other words, flavor seems to be a more important factor in determining the palatableness of the fruit than either sweetness or acidity.

RASPBERRIES.

Varieties.—The Ada, Carman, Earhart, Golden Queen, Hilborn, Johnston's Sweet, Marlboro, Reliance, Shaffer, Tyler and Turner, are recommended as worthy of trial The Crimson Beauty, Cuthbert, Hansell, Nemaha, and Rancocas, have not proved satisfactory on the Station grounds.

Quality—As with strawberries, so with raspberries, chemical analysis fails to reveal the secret of palatableness. Incidentally, however, it shows that the relative proportion of seeds becomes in some cases an important factor in judging the relative merits of different varieties.

BLACKBERRIES

For general planting in Ohio is recommended, of the varieties thus far tested at the Station, the Ancient Briton, Agawam, Snyder, and Lucretia Dewberry. The Erie, Early Harvest, Minnewaski, and Wilson, jr., are worthy of trial by amateurs.

WILLIAM J. GREEN, *Horticulturist.*